# Verification of interface friction of radial ultrasonic compression using FE simulation

## Abstract

It has been reported that the application of radial ultrasonic vibration on die during wire drawing process has reduced the drawing force. The reduction of the drawing force has been related to relative oscillation motion between die and wire surface which caused the reduction of interface friction. Since the oscillatory stress has not been measured, there were conflicting interpretations of the measured data and the possible factors that reduced the drawing force. This study proposes a numerical investigation into oscillatory stress behaviour of superimposed radial ultrasonic vibration with different interface friction. A series of finite element simulation was created to model a simple compression test of aluminium. The radial ultrasonic vibration was superimposed in short interval during plastic deformation. To investigate the effect of friction in the model, the coefficient of friction between die and specimen was changed from ).l = 0 to ).l = 0.25 during static and ultrasonic compressions. The calculated static and oscillatory stress-strain can be referred to the previous experimental data. This study shows that the reduction of forming force due to radial ultrasonic vibration can be related to the reduction of the interface friction. However the use of lubricant during radial ultrasonic compression has not much reduced friction further.